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(54) **ANTI-ALLERGIC SUBSTANCE, ANTI-ALLERGIC AGENT, AND FOOD**

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(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2002/0159976 A1* 10/2002 Glenn A23C 19/0323 424/93.2

FOREIGN PATENT DOCUMENTS

JP 2000-139404 A 5/2000

OTHER PUBLICATIONS

Pinto et al. 'Bioactive compounds and quantification of total ellagic acid in strawberries (Fragaria x ananassa Duch.)' Food Chem. 107:1629-1635, 2008.*

Iwamoto et al. 'Purification and identification of an IgE suppressor from strawberry in an in vitro immunization system.' Cytotechnol. 64:309-314, 2012.*

Iwamoto et al. 'Anti-allergic effect of strawberry extract.' J. Function. Foods. 5:1947-1955, 2013.*

Mitsuda et al. 'Detection of anti-allergic effects in strawberry extracts.' In: Kamihira M et al. (eds) Proceedings of the 21st annual and international meeting of the Japanese association for animal cell technology, Fukuoka, Nov. 2008. Animal Cell Technology: Basic & Applied Aspects vol. 16, pp. 353-357, 2010.*

Rosenfeldt et al. 'Effect of probiotics on gastrointestinal symptoms and small intestinal permeability in children with atopic dermatitis.' J. Pediatr. 145(5):612-616, 2004.*

Akira Iwamoto et al., "3Jl4pl0 Ichiao Chushutsubutsu no IgE Kotai Sansei Yokusei no Mechanism", Japan Society for Bioscience, Biotechnology, and Agrochemistry 2011 Nendo Taikai Koen Yoshishu, Mar. 5, 2011, vol. 2011, p. 215, particularly, col. of [Object], lines 1 to 3.

Akira Iwamoto et al., "AOIp In vitro Allergy Model ni Okeru Ichigo Chushutsubutsu no Ko- Allergy Sayo", Japan Society for Bioscience, Biotechnology, and Agrochemistry, Chushikoku Nishi Nippon Shibu, Japan Society of Nutrition and Food Science, Kyushu 022Okinawa Shibu, The Japanese Society for Food Science and Technology, Nishi Nippon Shibu, 2009 Nendo Godo Okinawa Taikai Koen Yoshishu, Oct. 30, 2009, p. 59, col. of [Object], [Method022Result].

Itoh, T., et al., Inhibitory effects of flavonoids isolated from Fragaria ananassas Duch on IgE-mediated degranulation in rat basophilic leukemia RBL-2H3, Bioorganic & Medicinal Chemistry, Aug. 1, 2009, vol. 17, No. 15, p. 5374-5379, particularly, p. 376, right column, col. of 4.1. Isolation of flavonoids and their chemical structures, line 1.

Kawahara, K. et al., "Effective induction and acquisition of human monoclonal IgE antibodies reactive with house-dust mite extract", Journal of Immunological Methods 233 (2000)33-40.

Khan, A.A. , et al . , Molecular cloning, characterization, and expression analysis of two class II chitinase genes from the strawberry plant, Plant Science, Mar. 2004, vol. 166, No. 3, p. 753-762, particularly, p. 759.

Masahiro Terauchi et al., "Antioxidant Activity and Anti-allergic Activity of Fragaria x ananassa Leaf", The Japanese Journal of Pharmacognosy, Feb. 20, 2007, vol. 61, No. 1, pp. 18 to 23, particularly, p. 19, left column, paragraph of Jikken Zairyo, table 1.

PCT/JP2012/060389 International Search Report mailed Jul. 24, 2012.

Van Der Ventel, M.L. , et al ., Differential responses to natural and recombinant allergens in a murine model of fish allergy, Molecular Immunology, Jan. 2011, vol. 48, No. 1, p. 637-646, particularly, Abstract, Results.

Yoshihisa Takahata et al., "Identification of Chicken Meat Proteins Detected with IgE Antibodies from Allergic Patients", Japanese poultry science, 2000, vol. 37, No. 4, pp. 228 to 233, particularly, abstract.

Supplementary European Search Report dated Sep. 16, 2014, in EP 12773893.8.

Suleimani et al., "Allergic rhinitis and its pharmacology," Pharmacology & Therapeutics, Jun. 1, 2007, 114(3):233-260.

* cited by examiner

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(57) **ABSTRACT**

This invention provides an anti-allergic substance that effectively inhibits allergic symptoms by inhibiting production of the IgE antibody associated with the development of allergies. Anti-allergic substances, pharmaceutical products (i.e., anti-allergic agents), and food (i.e., food with health-promoting benefits) containing strawberry-derived glyceraldehyde-3-phosphate do not cause side effects such as those caused by steroids, and such substances can be consumed through daily meals and can alleviate allergic symptoms.

1 Claim, 4 Drawing Sheets